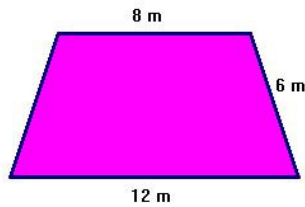


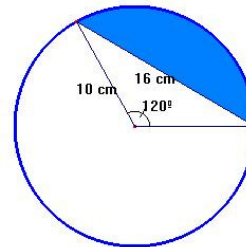
GEOMETRY

1. Find the area of the shaded regions:

a)



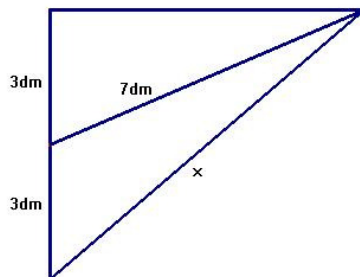
b)



(2.5 points)

2. The diagonal of a rectangle exceeds the length by 2 cm. If the width of the rectangle is 10 cm, find the length. (1 point)

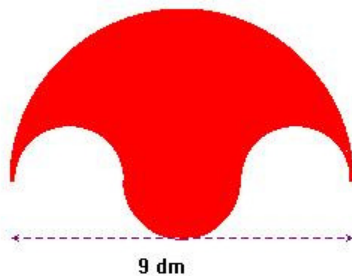
3. In the following diagram calculate x: (1 point)



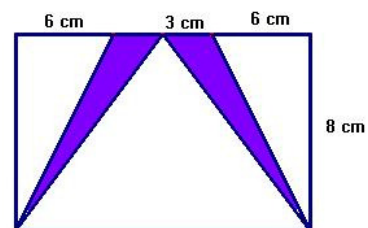
4. A circular pond of diameter 12 m is surrounded by a path of width 1 m. Find the area of the path. (1 point)

5. Calculate the perimeter and area of the shaded regions: (2.5 points)

a)



b)



(2 points)

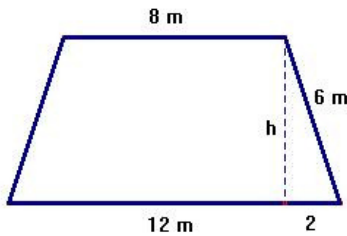
6. Solve:

a) $\frac{3x+1}{7} - \frac{2-4x}{3} = \frac{7x}{6} - \frac{5x+4}{14}$

b) $x^2 + (1-x)^2 = 5 - (2-x)^2$

SOLUTION

2. Find the area of the shaded regions:

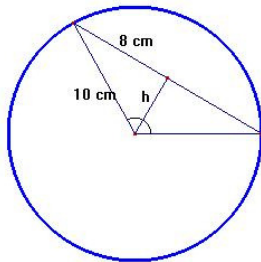


a) Trapezoid: $A = \frac{B+b}{2} \times h$

We calculate the height using Pythagoras Theorem:

$$6^2 = h^2 + 2^2 \rightarrow h^2 = 36 - 4 = 32 \rightarrow h = \sqrt{32} \text{ m}$$

$$A = \frac{B+b}{2} \times h = \frac{12+8}{2} \sqrt{32} = 10\sqrt{32} = 56.57 \text{ m}^2$$



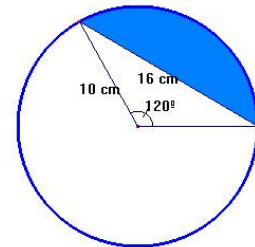
b) We calculate the area of the circle sector and the area of the triangle:

$$10^2 = h^2 + 8^2 \rightarrow h^2 = 100 - 64 = 36 \rightarrow h = 6 \text{ cm}$$

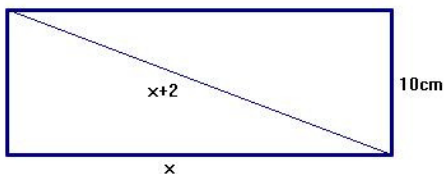
$$A_{\text{triangle}} = \frac{b \times h}{2} = \frac{16 \times 6}{2} = 48 \text{ cm}^2$$

$$A_{\text{sector}} = \frac{\pi r^2 \times n^\circ}{360} = \frac{100\pi \times 120}{360} = 104.72 \text{ cm}^2$$

$$A_{\text{shaded}} = A_{\text{sector}} - A_{\text{triangle}} = 104.72 - 48 = 56.72 \text{ cm}^2$$



2. The diagonal of a rectangle exceeds the length by 2 cm. If the width of the rectangle is 10 cm, find the length.



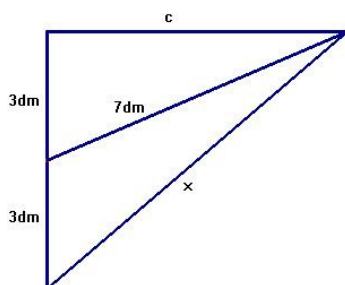
Pythagoras Theorem:

$$(x+2)^2 = x^2 + 10^2 \rightarrow x^2 + 4x + 4 = x^2 + 100$$

$$4x + 4 = 100 \rightarrow 4x = 96 \rightarrow x = 24 \text{ cm}$$

The length is 24 cm

3. In the following diagram calculate x:



Pythagoras Theorem (little right-triangle):

$$7^2 = c^2 + 3^2 \rightarrow c^2 = 49 - 9 = 40 \rightarrow c = \sqrt{40}$$

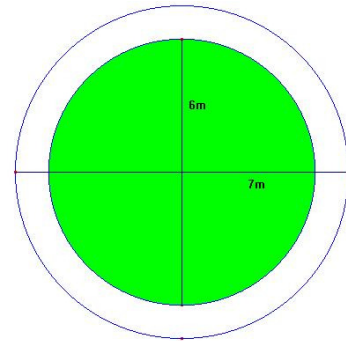
Pythagoras Theorem (big right-triangle):

$$x^2 = c^2 + 6^2 \rightarrow x^2 = 40 + 36 = 76 \rightarrow x = \sqrt{76} = 8.72 \text{ dm}$$

4. A circular pond of diameter 12 m is surrounded by a path of width 1 m. Find the area of the path.

$$A_{\text{path}} = A_{\text{big_circle}} - A_{\text{pond}} = \pi R^2 - \pi r^2$$

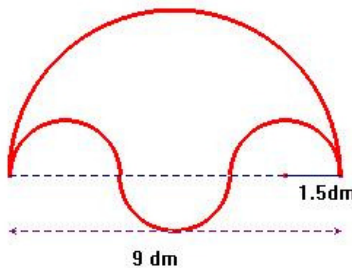
$$A_{\text{path}} = 49\pi - 36\pi = 13\pi = 40.84\text{m}^2$$



5. Calculate the perimeter and area of the shaded regions:

a)

Area:



$$\text{Big semi-circle: } A_{\text{BSC}} = \frac{4.5^2 \pi}{2} = 31.81\text{dm}^2$$

$$\text{Little semi-circle: } A_{\text{LSC}} = \frac{1.5^2 \pi}{2} = 3.53\text{dm}^2$$

$$A = A_{\text{BSC}} + A_{\text{LSC}} - 2A_{\text{LSC}} = A_{\text{BSC}} - A_{\text{LSC}} = 28.28\text{dm}^2$$

Perimeter:

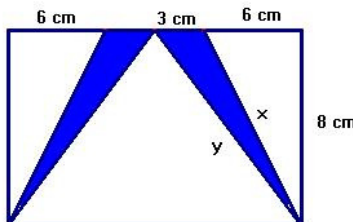
$$\text{Big semi-circle: } P_{\text{BSC}} = \frac{2\pi \cdot 4.5}{2} = 14.14\text{dm}$$

$$\text{Little semi-circle: } P_{\text{LSC}} = \frac{2\pi \cdot 1.5}{2} = 4.71\text{dm}$$

$$P = P_{\text{BSC}} + P_{\text{LSC}} + 2P_{\text{LSC}} = P_{\text{BSC}} + 3P_{\text{LSC}} = 28.28\text{dm}$$

b)

Area: BLUE TRIANGLES



$$A_{\text{triangle}} = \frac{b \times h}{2} = \frac{6 \times 8}{2} = 24\text{cm}^2$$

$$\text{Shaded area: } A = 2 \times 12 = 24\text{cm}^2$$

$$\text{Perimeter: } P = 2 \times (3 + x + y)$$

Pythagoras Theorem :

$$x^2 = 8^2 + 6^2 \rightarrow x^2 = 64 + 36 = 100 \rightarrow x = 10\text{cm}$$

$$y^2 = 8^2 + 9^2 \rightarrow y^2 = 64 + 81 = 145 \rightarrow y = 12.04\text{cm}$$

$$P = 2 \times (3 + 10 + 12.04) = 50.08\text{cm}$$

6. Solve:

$$\text{a) } \frac{3x+1}{7} - \frac{2-4x}{3} = \frac{7x}{6} - \frac{5x+4}{14}$$

$$\text{b) } x^2 + (1-x)^2 = 5 - (2-x)^2$$



Maths 3rd ESO